Civil Engineering 2C04
Structural Mechanics - Winter Term 2020

Instructor:  
Mehdi Shafikhani (shafikhm@mcmaster.ca)

Teaching Assistants:  
Ahmed Abdel Maksoud (abdela33@mcmaster.ca)
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Schedule:

Lectures:  
Monday, Wednesday (2:30-3:20) BSB B135  
Fridays (4:30-5:20) BSB B135  
The lectures will be used to present theoretical background, approaches to analysis, and applications to a variety of problems.

Tutorial:  
T1: Thursday (2:30-4:20) ABB 164  
T2: Fridays (9:30-11:20) ABB 136  
The tutorials will be used for additional examples and question and answer sessions.

Lab:  
L1: Wednesday (8:30-11:20) JHE 121  
L2: Tuesdays (8:30-11:20) JHE 121  
You will only be required to attend one one-hour laboratory. The lab times may also be used for additional course activities such as lectures.

Course Content

This is a second course in structural mechanics within McMaster’s civil engineering program (the first course is 2P04). The focus of this course is on further developing your understanding of basic skills in structural mechanics (also referred to as mechanics of materials, or strength of materials). These skills are fundamental to subsequent courses in structural engineering. This course mainly deals with concepts of stress, strain and energy applied to civil engineering structures. In this course we will cover (time permitting) aspects related to the following topics:

- Shear force and bending moment diagrams
- Bending of beams for linear and nonlinear material behaviour
- Shearing of beams for linear behaviour
- Torsion of beams for linear and nonlinear behaviour
- Combined loading
- Transformation of stress and material failure criteria
- Deflections of structures and energy methods
- Column buckling and elastic stability
Learning Outcomes

At the end of this course students should be able to:
1. Assess integral properties of problems including boundary conditions, loading conditions, determinant vs. indeterminate, and linear vs. non-linear.
   a. CEAB attribute 1.3 “Competence in Engineering Fundamentals”
   b. CEAB attribute 3.2 “Capable of selecting appropriate model and methods and identify assumptions and constraints.”
2. Use the knowledge from (1) to select appropriate methods to solve desired quantities.
   a. CEAB attribute 3.1 “Able to recognize and discuss applicable theory knowledge base”
3. Verify solutions from (2) using additional knowledge and/or engineering judgement.
   a. CEAB attribute 2.3 “Ability to obtain substantiated conclusions as a result of a problem solution including recognizing the limitations of the solutions.”
4. Evaluate laboratory data against theoretical solutions and use engineering judgement to discuss discrepancies.
   a. CEAB attribute 3.3 “Can estimate outcomes, uncertainties and determine appropriate data to collect.”

Recommended Reference Material

The recommended textbook for the course is “Mechanics of Materials”, by Beer, Johnson and DeWolf. The textbook that we will attempt to use is R.C. Hibbeler, “Mechanics of Materials” since this was purchased for CE 2P04.

Avenue

http://avenue.mcmaster.ca/
Lecture notes, Problem sets, Assignments, solutions, lab information and notices will be posted on Avenue. Students are expected to check and read all the materials posted on avenue.

Email

All email communication with the instructor and TAs must be sent from your @mcmaster.ca address and sent to the @mcmaster.ca addresses listed above. Do not send email through the Avenue email system as this system is not monitored. Questions on course material (i.e. how do I solve this problem?) are best explained in person and will not be answered via email; please visit office hours.

Practice Problems and Assignments

Weekly practice problems will be assigned and discussed in the tutorials. They will not be handed in or graded. Many additional problems can be found in the textbook and you are strongly encouraged to use these for practice. The purpose of the practice problems is to give you an opportunity to develop an understanding of the application of the course material. While discussion with other students of the background and approach to solution of problems is often beneficial, you need to ensure that you can actually solve the problems on your own without notes or textbook examples to guide you (i.e., the way it will be during the tests and exam).
Four assignments will be given during the term to assist in understanding the course materials. Students are expected to work independently on them and hand in the solutions. This will be graded by the TA.

**Term Tests**

There will be three term tests. If the date and time of the term tests conflict with your regular academic schedule, you need to inform the instructor no later than January 16 by email. The term tests will be closed book. The necessary equations will be provided. During exams you may use only the McMaster Standard Calculator.

If you wish to appeal the grading of a test, this must be done within one week of the date on which the tests were officially returned.

**Evaluation and Grading**

Your final grade will be based on:

- Three midterms (15% each, 45% total)
- Four assignments (4% each - 16% total)
- Lab (14% total) – To pass the course you must participate in the lab and submit a lab report
- Final exam (25%)

The final percentage grade will be converted to a letter grade using the Registrar's scale. If a student misses a term test, he/she needs to contact the Associate Dean of Engineering in order to obtain permission for relief (Refer to the McMaster Undergraduate Calendar for the relevant policy). If a relief is granted, there will be no makeup test and the missed term test will be re-allocated to the final examination.

Students that have written and received a grade equal to or greater than 60% on all three term tests and whose cumulative average is equal to or greater than 75% have the option to be exempt from writing the final exam. If you meet the requirements and choose not to write the final exam, you need to inform the instructor by email no later than April 03, 2020. For those that receive an exemption, the individual components for the final grade will be weighted as follows:

- Three midterms (23.3% each, 70% total)
- Four assignments (4% each - 16% total)
- Lab (14% total) – To pass the course you must participate in the lab and submit a lab report

**Lab**

You are required to participate only once in a one-hour laboratory session. Details on the laboratory sections, including scheduling and requirements will be provided throughout the course.

**Laboratory Safety**

The Faculty of Engineering is committed to McMaster University’s Workplace and Environmental Health and Safety Policy which states: "Students are required by University
policy to comply with all University health, safety and environmental programs". It is your responsibility to understand McMaster University Workplace and Environmental Health and Safety programs and policies. For information on these programs and policies please refer to McMaster University Environmental and Health Support Services Occupational Safety Risk Management Manual at: http://www.workingatmcmaster.ca/med/document/Lab-Safety-Handbook-1-36.pdf. It is also your responsibility to follow any specific Standard Operating Procedures (SOPs) provided for some of the experiments and the laboratory equipment. Laboratory Instructions specific to the CIV ENG 2C04 laboratory work are as follows:

- No one will create a situation that could compromise or jeopardize the safety of themselves or anyone else in the lab
- Obey all instructions given to you by the Teaching Assistant and / or lab technical staff

Failure to comply with safety rules, will result in the individual student being denied access to the lab and given a ‘did not complete’ grade for the lab session

Important Notes

“The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites at least weekly during the term and to note any changes”.

- All the lectures, tutorials and labs are mandatory.
- CE 2C04 students are to attend Registrar’s office assigned tutorial section.
- Phones may not be used during classes, tutorials, labs, or exams. Turn them off beforehand and put them away.

Academic Integrity

You are required to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: “Grade of F assigned for academic dishonesty”), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at www.mcmaster.ca/academicintegrity.

The following illustrates only three forms of academic dishonesty:
1. Plagiarism. e.g. the submission of work that is not own or for which other credit has been obtained
2. Improper collaboration in group work
3. Copying or using unauthorized aids in tests and examinations.

**Protection of Privacy Act (FIPPA)**

The Freedom of Information and Protection of Privacy Act (FIPPA) applies to universities. Instructors should take care to protect student names, student numbers, grades and all other personal information at all times. For example, the submission and return of assignments and the posting of grades must be done in a manner that ensures confidentiality - see http://www.mcmaster.ca/univsec/fippa/fippa.cfm

**Academic Accommodation of students with Disabilities Policy**

Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) https://sas.mcmaster.ca/ to make arrangements with a Program Coordinator. Student Accessibility Services can be contacted by phone 905-525-9140 ext. 28652 or e-mail sas@mcmaster.ca. For further information, consult McMaster University’s https://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicAccommodation-StudentsWithDisabilities.pdf

**Academic Accommodation for Religious, Indigenous or Spiritual Observances (RISO)**

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students requiring a RISO accommodation should submit their request to their Faculty Office normally within 10 working days of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

**Requests for Relief for Missed Academic Term Work – MSAF (Assignments, Mid-terms, etc.)**

The McMaster Student Absence Form is a self-reporting tool for Undergraduate Students to report absences that last up to 5 days and provides the ability to request accommodation for any missed academic work. Please note, this tool cannot be used during any final examination period.

You may submit a maximum of 1 Academic Work Missed requests per term. It is YOUR responsibility to follow up with your Instructor immediately regarding the nature of the accommodation.
If you are absent more than 5 days or exceed 1 request per term you MUST visit your Associate Dean's Office (Faculty Office). You may be required to provide supporting documentation.

This form should be filled out immediately when you are about to return to class after your absence. [http://www.mcmaster.ca/msaf/](http://www.mcmaster.ca/msaf/)

**Anti-Discrimination**

The Faculty of Engineering is concerned with ensuring an environment that is free of all discrimination. If there is a problem, individuals are reminded that they should contact the Department Chair, the Sexual Harassment Officer or the Human Rights Consultant, as soon as possible. [https://www.mcmaster.ca/policy/General/HR/Discrimination_and_Harassment.pdf](https://www.mcmaster.ca/policy/General/HR/Discrimination_and_Harassment.pdf)

**Extreme Circumstances**

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.

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